

---

XXVI. *On certain Species of Carduus and Cnicus which appear to be dioecious.* By Thomas Smith, Esq. F.R.S. and L.S.

Read February 5, 1822.

ALTHOUGH Linneus founded his orders in the class *Syngenesia* upon nice distinctions, drawn from the various modes in which the florets of different sexes are arranged in each capitulum, the fact that many species were dioecious, or had the male and female flowers on distinct plants, almost entirely escaped his observation; for in the last edition of his *Genera Plantarum*, published in 1764, he remarks, that *Gnaphalium dioicum* is a rare example of the separation of the sexes in this class.

Jussieu in his *Genera Plantarum*, published in 1789, does not appear to have been aware of any other example than the above, for he observes at the end of his generic character of *Gnaphalium*, “Species una dioica insigni exceptione.”

It has however been pointed out to me by my friend Mr. Brown, that at the time this observation of Jussieu’s was published, Friedrich Ehrhart had shown that some species of *Tussilago* were dioecious: and our native species *Tussilago hybrida* and *Petasites* now rank as one only under the name of *Petasites*, which is the male, *hybrida* being the female\*. Mr.

\* Vide Friedrich Ehrhart *Beiträge zur Naturkunde*, vol. iii. 1788. The paper is however dated December 1783, and had previously been printed (I believe) in the *Hanover Magazine*, probably about the latter date.

It may be proper nevertheless to note, that M. Cassini, whose extended and accurate investigation of this class gives great weight to his opinion, has come to an opposite conclusion



Mr. Brown in his *Observations on the Compositæ*, inserted in the 12th volume of the *Transactions* of this Society, announced many more instances of this remarkable circumstance: it forms a part of his character of the genus *Baccharis*, which Richard and Jussieu had previously proposed to limit to such species as were dioecious, and which thus comprehending *Molina* of the *Flora Peruviana*, contains many species. The plants forming two of the new genera there proposed (*Petrobium* and *Brachylæna*) he has ascertained to be dioecious; another genus, *Piptocarpha*, he suspects to be so; and the dioecious *Gnaphaliums* (to which he shows that *margaritaceum* must be added) are also thrown into a separate genus.

It will be observed, that the greater part of the genera mentioned belong to orders which have florets of different sexes in the same capitulum; in such the prevalence of one sort of floret in all the capitula of a plant to the exclusion of the other is a circumstance not so unexpected as in the order *Syngenesia Æqualis*, where all are hermaphrodite; to this, however, *Petrobium* and *Brachylæna* are referable; and Mr. Brown's description (in the same paper) of the separation of the sexes in *Serratula tinctoria*, led me to notice the same circumstance in *Serratula*, or, as it is now most frequently called, *Cnicus arvensis*, and in some other species of the genera *Carduus* and *Cnicus*, all of which were supposed to have hermaphrodite flowers only.

So long ago as the year 1807 I had observed that there were many plants of *Serratula tinctoria* in which the antheræ were entirely abortive; but finding others in which all the organs were

conclusion to the above, and considers the two plants as distinct species. His words are: "Les styles du *Tussilago hybrida* diffèrent assez de ceux du *T. Petasites*, pour démontrer, indépendamment de plusieurs autres argumens, que ces deux plantes n'appartiennent point à la même espèce, comme l'ont cru très mal-à-propos quelques botanistes modernes." *Journal de Physique*, tom. lxxvi. p. 191.

apparently



apparently perfect, it did not occur to me that there was any separation of sexes.

On re-examining this plant, in consequence of Mr. Brown's observations, the striking difference between the male and female flowers, which had formerly induced me to look for some specific difference between the plants bearing them, appeared to point out a very ready mode of examining the nearly allied species by the external appearance of their capitula without the labour of a minute dissection.

Looking at *Cnicus arvensis* with this view, I soon found that different patches of it had flowers which presented differences similar to those of the *Serratula tinctoria*, and dissection confirmed the external appearances; by the examination of very many specimens, I ascertained that some plants bore flowers the antheræ of which were invariably abortive, and that in others the ovaria as invariably withered without producing seeds.

A more detailed account of the differences between the male and female flowers is as follows.

The female florets are somewhat shorter and smaller than the male, particularly the laciniaë and dilated part of the tube of the corolla; hence the male capitulum, when in flower, appears much larger than the female. The part of the style which is bearded in the male is shorter in the female, and destitute of pili, except a very few at the base of the fissure; this fissure in the male opens but little; in the female it is very much opened, having the margins bent back and the apices recurved; the apex is divided in the male, but the apices are straight: the male capitulum is more oval, that of the female more cylindrical inclining to conical.

The part of the style which bears the stigma is waved in the female, straight in the male; in the female flat, bearing the stigma on the edges generally of a deeper purple than the lower part;



part; in the male compressed, cylindrical, of the same shade of colour as the part below it.

The male florets are more exerted beyond the scales of the capitulum, and therefore longer in proportion to it than the females, which frequently project very little beyond the scales.

It is not a little remarkable, that the separation of the sexes should have been so long overlooked in this unfortunately most abundant of weeds; the great difference in the appearance of the male and female flowers has not however passed altogether unnoticed, for Roth in his *Flora Germanica*\*, having described *Serratula* (our *Cnicus*) *arvensis*, says, “Variat primo calyce minori ovato oblongo floribus duplo majoribus pallidioribus, stigmatibus subbifidis erectis.” This description, I think, there can be no doubt refers to the male plant.

It is I believe a common observation, that *Cnicus arvensis* rarely produces seed: and this circumstance has been attributed to its increasing so much by the root; the separation of the sexes however presents a much more satisfactory explanation: and I have mentioned before, that the plants of each sex grow together in large patches without intermixture; hence the chance of impregnation being effected is much diminished.

A useful economical application may perhaps be made of this fact, particularly if the observation of Villars in his *Histoire des Plantes de Dauphiné* be correct†: he says, that there is a simple means of destroying this plant, which is by permitting it to flower, after which it dies; if, however, it be cut down before flowering, it will increase in all directions. If the seeds were perfect, it does not seem that much could be gained by this plan: as however there is a great chance that they may not be so, should it be true that the plant dies completely after flower-

\* Tom. ii. pars 2. p. 295.

† Tom. iii. p. 23.



ing, it may prove a safe and successful means of diminishing the quantity of this troublesome weed.

I have examined several others of our native species of *Carduus* and *Cnicus* in their wild state, and have found female plants in *Cnicus palustris*, *pratensis*, and *acaulis*. In *Carduus nutans*, *acanthoides*, and *tenuiflorus*, and in *Cnicus lanceolatus* I met with no deviation from the usual structure. *Carduus marianus*, which I saw in a garden only, was hermaphrodite, as was *Cnicus erio-phorus* in the same place. *Cnicus tuberosus* and *heterophyllus*, which I have also only seen cultivated, were both female plants; and the figure of the latter, given by Professor Hooker in the *Flora Londinensis*, is manifestly a female. In the Herbariums specimens of both species occur with perfect antheræ.

Of *Carduus nutans*, *acanthoides*, and *tenuiflorus*, which I have mentioned as having hermaphrodite flowers only, it should be noticed that I have seen very few of the first; of the other two indeed a considerable number, but all growing in one spot. *Cnicus lanceolatus* is everywhere too obvious to leave any doubt respecting it.

*Cnicus palustris*. Having examined a considerable number of specimens, the female plants I find are not numerous, and bear but a small proportion to the antheriferous. The difference in external appearance between the female and the antheriferous flowers is not so great or obvious as in some other species; the florets are of the same size, but the antheriferous ones expand more, and the anthers project far beyond the laciniaë of the corolla; the style is at this period much longer than it ever is in the female; this is distinguished by the small abortive antheræ, which not rising beyond the little expanded laciniaë of the corolla, are scarcely seen, while the projecting styles have their stigmata more developed and a little waved.

*Cnicus pratensis* I have seen in abundance only in one situation  
on



on Ashdown Forest, near Withyham in Sussex: here both the female and antheriferous plants were growing, but in separate patches: in two other spots in the same neighbourhood, where there was not a great quantity, I found only antheriferous plants.

*Cnicus acaulis* I have seen growing abundantly, and the female plants seemed to be as frequent as the antheriferous.

In examining exotic species, I was generally reduced to a single plant of each; and supposing it to be dioecious, it was probably an equal chance whether it was a male or a female: if a female, it was readily known by the imperfect antheræ: but it was not so easy to distinguish a male from an hermaphrodite: this I attempted to do by examining the capitula, which had flowered; and when all the ovaria proved abortive, I concluded that the plant was a male.

I am aware, nevertheless, that this is a very doubtful test in a cultivated plant, the flowers of which are frequently barren from causes that are not obvious.

By the kindness of Mr. Anderson I was enabled several times to examine the numerous species of the genera *Serratula*, *Carduus*, and *Cnicus*, which are cultivated in the Botanic Garden at Chelsea; and about half the plants to which, from the state of their flowering, I could apply the tests above mentioned, proved either male or female.

In *Serratula*, the only species not hermaphrodite was the *tinctoria*.

In the genera *Carduus* and *Cnicus* I ascertained the following, as named in Mr. Anderson's manuscript catalogue, to be female plants.

*Cnicus tuberosus*, *ochroleucus*, *semipectinatus*, and *Salisburgensis*.

Three or four others I suspect to be male plants; for, upon examining many capitula that had flowered, I could not find any perfect seeds.



I have looked over the specimens of *Carduus* and *Cnicus* in the Banksian Herbarium, and the following appear to be female plants :

*Carduus rivularis*, *Chius*, *rigens*, *serratuloides*, *paniculatus*. *Cnicus leucocephalus*, *rigens*, *Erisithales*, *tuberosus*, *acaulis*, *oleraceus*.

There are specimens of both sexes of *Erisithales* and *acaulis*; the specimen of the female plant of *acaulis* is remarkably distinct from the male.

Since I first turned my attention to this subject, a doubt has arisen whether in many, perhaps in most of the cases in which female plants occur, the antheriferous plant may not be an hermaphrodite rather than a male.

The plant which I first ascertained to be dioecious was *Cnicus arvensis*: in this the separation of the sexes is undoubted and unequivocal; for though I have examined a very great number of male plants, the ovaria have always proved abortive, except in one instance, in which two of the ovaria in one capitulum were most decidedly impregnated, the embryo being so far advanced that no doubts could be entertained about it: the stigmata of these flowers did not, however, appear to differ from those of the numerous unimpregnated ovaria which surrounded them: this case must therefore be considered as merely accidental.

Having ascertained that this species was dioecious, I concluded that all the others were so in which female plants were to be met with; but, in some, hermaphrodite plants certainly occur, nor have I been able to detect any males amongst these. It is not easy to distinguish between the hermaphrodite and the male; the only unequivocal test of the latter seems to be, that the antheræ should have perfect pollen, and that the ovaria should be abortive; two states of the flowers which it is rather difficult to meet with on the same plant at the same time.

The stigma does not supply a distinction sufficiently decisive;



for although, when the stigma of the female flower is compared with that part in the antheriferous one, a much greater development is perceived in the female, still in the former it is apparently sufficiently developed for the purposes of impregnation: hence it is not possible, from seeing a few plants with perfect antheræ, to say whether the species is dioecious or not; it can only be determined by an examination of numerous specimens.

There is another source of error: In *Cnicus pratensis* the antheriferous plants which were growing near the females had when gathered the appearance of being males; but having kept them for some days and noticed the progress of the development of the different parts of the flower, it was seen that, when the pollen of a particular flower was entirely dispersed, the stigma became developed nearly as much as in the female flower, although while the style remained covered with pollen it was merely indicated by a line, which induced the idea that the plant was a male: I afterwards found also the antheriferous capitula impregnated, except the florets of the ray, the stigmas of which were not developed nor the ovaria impregnated: whether this is constantly the case, remains for future inquiry.

Neither in *Cnicus palustris* nor in *acaulis* have I ascertained that male plants exist; in *palustris*, from the numerous specimens examined, I should conclude that they do not, and that this plant therefore consists of hermaphrodites and females, the former being the most numerous.

In another plant of the *Carduaceæ*, equally common with *Cnicus arvensis*, I have also found female plants; this is the *Centaurea nigra*; but I have not found any that can be called males, as those plants in which the anthers are perfect have perfect seeds.

The female and hermaphrodite (as it must be called here) differ as the male and female do in *Cnicus arvensis*. The female



florets are smallest; they project but little beyond the involu-  
crum; their laciniae are but slightly divaricate; their imperfect  
antheræ do not rise above the apices of the laciniae of the corolla;  
their filaments are never visible: in the hermaphrodite the sta-  
mina project so much, that at the period of their full vigour the  
filaments are seen above the tube of the corolla. These differences  
are less obvious after the flowering is past; for, the stamens being  
retracted, the hermaphrodite is much more like the female: as to  
numbers, the hermaphrodite is the most prevalent.

In *Serratula tinctoria*, in which Mr. Brown first pointed out  
the existence of female plants, I have not been able to satisfy  
myself that males are to be met with; for in the antheriferous  
plants I have always found the ovaria impregnated. The seeds  
of the female differ in being larger than those of the hermaphro-  
dite. In this species plants occurred which showed a regular  
gradation from the female to the hermaphrodite; in one, the an-  
theræ were much smaller, shorter, and more imperfect than they  
most frequently are found in the female; in another they were  
as much larger, projecting, and embracing the style as in the  
hermaphrodite, but containing only a few grains of abortive  
pollen.

The numbers of the female and hermaphrodite are nearly  
equal. The stigma of the female is developed very soon after  
the flower opens; in the hermaphrodite, on the contrary, it does  
not appear until the pollen of its own antheræ is dispersed, the  
style remaining undivided to the apex till this period; the aid of  
the antheræ of some adjoining flower consequently becomes ne-  
cessary for the purposes of impregnation.

This is a striking example of a mode of impregnation which,  
according to M. Cassini, prevails nearly throughout the whole  
family of the *Compositæ*, and which renders the presence of two  
flowers at the very least necessary to the impregnation of either;  
constituting,



constituting, in fact, a species of monoecious inflorescence ; and as it requires some external aid for its completion, forms a transition to the decided separation of the sexes in distinct florets, which are further removed into distinct capitula in the monoecious genera *Xanthium* and *Ambrosia*, and still further in the dioecious plants.

This process is analogous to that which takes place in a few instances in the animal kingdom, in what are on this account termed androgynous animals, of which the *Helix hortensis* is a well known example. In the androgynous animal, although it has both the male and female organs complete, the one cannot be impregnated by the other on account of their relative position : in the androgynous flower, impregnation is prevented by the organs of the two sexes not being developed at the same time.

I am not aware that any particular term has been adopted to designate flowers of this kind ; but as they are not confined to the family of the *Compositæ*, it might be useful to point them out by an appropriate name, and *androgynous* seems strictly applicable. Linnæus has indeed used the term *Flos androgynus*, but it is not, I believe, known what precise meaning he intended to convey by it ; from which cause it has fallen into disuse.

It being a matter of some interest to ascertain what proportion of the species of the genera I have mentioned, or of those allied to them, have the male and female flowers on different plants ; and as this can only be effected by examining numerous specimens in their wild state, it may be useful to point out some of the most obvious and striking distinctions between the female and antheriferous capitula, and which are such as may be readily observed in a cursory survey of the plants : to determine whether the flowers are male or hermaphrodite, recourse must be had to the seeds.



The flowers of the antheriferous capitulum are much larger, and the laciniaë more divaricate, the perfect antheræ rise beyond the laciniaë and embrace the style; in the female the abortive antheræ scarcely appear beyond the tube of the corolla, and, being generally very small, are not seen except upon a close examination: this gives the female capitulum a uniform colour and appearance, which is destroyed in the antheriferous one by the projecting of the antheræ, frequently of a different shade of colour from the corolla, and which, even when withered, remain exerted nearly to the tips of the laciniaë, producing a ragged and discoloured appearance.

The stigma of the female is almost always much more developed, and in general somewhat waved; it is very remarkably so in the female *Serratula tinctoria*.

In *Cnicus arvensis* there is another circumstance which distinguishes the sexes even after flowering, and which is perhaps more striking than any other; this is produced by the pappus. In the female, the pappus at the time of flowering is shorter than the tube of the corolla, and nearly as long as the scales of the involucre; after flowering it lengthens very considerably, and, when the seed is ripe, is twice its former length, and entirely conceals the persistent corolla: when the seeds are to be dispersed, the female plants are white with the large and abundant pappus, which appears projecting beyond the scales of the involucre before it is discharged by their expansion.

In the male, the pappus at the time of flowering is nearly of the same length as in the female: it however never increases afterwards, and is concealed after flowering by the withered corolla and antheræ: at this period, therefore, the male plants are distinguished by the brown withered capitula, which appear generally to perish without discharging their abortive seeds and useless pappus.



My observations have not been sufficiently extensive to enable me to say whether this lengthening of the pappus is a very unusual occurrence; but I suppose it to be so from the following remark of M. Cassini, the universal application of which must be modified by the fact which I have mentioned: “L'aigrette ne prend aucun accroissement après la fleuraison, même dans le cas où l'ovaire des synathérées grandit beaucoup après cette époque\*.”

The figures of these plants are not in general delineated with sufficient attention to detail, to show whether they are taken from a male or a female specimen; in some cases, however, there is little room for doubt, as in Professor Hooker's figure of *Cnicus heterophyllus*, to which I have already referred.

*Cnicus palustris*, *English Botany*, pl. 974, and *Cnicus acaulis*, *Flora Danica* 1114, are certainly antheriferous plants.

The figures of *Cnicus arvensis* in the *Flora Londinensis* and in *English Botany*, pl. 975, are females; but the figure of Fabius Columna in his *Ecphrasis*, i. 46. (the first probably ever executed of this plant) is remarkable for its great accuracy, showing clearly that it is a male: and exhibiting moreover the elongation of the pappus in the female after flowering, by a comparative view of it as attached to a floret and to a seed; a circumstance unnoticed by others, even where the seed has been delineated with the pappus.

\* *Journal de Physique*, tome lxxxv. p. 17.



---

XXVII. *The Natural History of Lamia Amputator of Fabricius.*  
*By the Rev. Lansdown Guilding, A.B. F.L.S. &c.*

*Read March 5, 1822.*

No apology, I conceive, will be thought necessary for offering to the notice of the Linnæan Society the natural history of a single species of the interesting family of *Cerambycidae*, which, in its earlier stages, has never been described by the entomographer.

Of all the coleopterous insects destined to accelerate the decay of timber, there is no species perhaps whose habits are more singular than those of the insect whose history is here detailed. The *Imago* has long since been described by Fabricius from the cabinet of the great and lamented Banks, which is now in the possession of the Linnæan Society.

INSECTA COLEOPTERA.

Sect. TETRAMERA.

Fam. *Cerambycidae*, Leach.

LAMIA AMPUTATOR. *Fabr.*

TAB. XXX.

L. thorace spinoso, elytris cinereis nigro irroratis maculisque numerosis testaceis.

*Fabric. Entom. Syst. tom. i. b. p. 276. 34. Syst. Eleuth. ii. p. 293. 60.*

Long.